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VOLUME VII • NUMBER 3 JUNE, 1943

The Railroad Aspect of Lubricating Greases

By C. B. BRYANT
Engineer of Tests, Southern Railway System

(Presented before the National Lubricating Grease Institute, New Orleans, La., October 27, 1942.)

While railroads are large users of various classes of lubricating greases, it is with some hesitancy that I consented to talk to you today. Obviously, a railroad Engineer of Tests cannot be highly expert in all of the materials with which he is concerned. He is supposed to know more about greases than you gentlemen who make them, is supposed to be a better metallurgist than those in the steel companies, should know more about paint and varnish than the manufacturers of those products, etc. No one person can fulfill all these conditions and actually we depend on manufacturers, such as yourselves, for much of the information on which we base specifications and test methods. When Mr. Karns and I were discussing the subject of this talk, I expressed this point of view to him, but he felt that the user's point of view might be interesting and helpful because of the different aspect it expressed as compared with that of the manufacturer to which you are more accustomed.

In order to give you a little background of the extent to which greases are used by railroads, let me cite consumption figures for the Southern Railway System covering uses during 1941. Our largest single item in lubricating grease is driving journal compound, used to lubricate the driving journals of locomotives, of which we consumed 1,264,000 lbs. The next largest item is the grease used to lubricate rail on curves, 431,000 lbs. Pressure gun grease, used almost exclusively in pressure gun lubrication of locomotives, is next, with a consumption just under 400,000 lbs. Brake cylinder lubricant, used in the main pressure cylinders of air brakes, 24,000 lbs. Ordinary cup grease, principally used in the lubrication of shop machinery, 20,000 lbs. Residual type greases, used for the lubrication of hub liners on steam locomotives, traction gears on Diesel-electric locomotives and center plates of cars, 12,000 lbs. There is a variety of other classes of grease for various special applications used in small amount. Much of what I shall tell you about these various greases may be obvious to all of you, but I shall mention the various considerations which seem interesting and important to me and hope that they will not seem trite to you.

Driving journal compound, as you probably all know, is a sodium base grease, consisting of approximately one-half soap and one-half heavy oil, approximating cylinder stock consistency. It has the general appearance and consistency of ordinary laundry soap. It is fed to the journals which it lubricates from blocks, into which it has previously been molded by pressure, these blocks being pressed lightly against the lower portion of the journals by means of a soft spring and follower. The rate of feed of the grease to the revolving journal is con-

(Continued on page 5)

CORRECTION

In the May issue of the Spokesman, reference was made to the use of a specific brand of grease which is counter to the policy of the Institute. This was an oversight on the part of the editor. The Institute in no way recommends or approves any type of lubricant either by TRADE NAME, BRAND or OTHERWISE.

Reviewing the 1942 Cars—What They Need for 1943

By WALTER E. BLAINE
CHEK-CHART Field Engineer

(Continued from May Issue)

'43 Spring Lubrication Change-Over Is Conservation Maintenance

Lubrication services in the Spring Change-Over Season programs just ahead will be some of the most important features of automobile conservation maintenance for 1943.

The ground work for selling in the spring market has been laid. Car owners are well aware of the scarcity of new vehicles, of new tires, and of the dearth of mechanics who can turn out a competent job. All these items point out the necessity of making present vehicles last for the duration.

Lubrication services can be tied-in with car conservation maintenance. The facts back of the spring seasonal recommendations make dramatic stories in building a merchandising program. These seasonal change-over services have been protecting customers' cars for years, and now they are all the more important since lubrication service tends to a time as well as a mileage basis. Customers and servicemen must be all the more careful and discriminating this year in performing these services.

CHEK-CHART Service Bulletin reviews lubrication in the Spring Change-Over Season program to aid marketers in pointing out to customers the relation of these services to car conservation, and to emphasize the features of these services.

Servicing of the transmission and differential is traditional in the Spring Change-Over Season, and marketers have several good talking points in servicing the gears.

First of all, the gear boxes should be drained thoroughly, and this is done better after the car has run long enough to warm up the units. Some of the old, thick lubricant may still cling to the gears, shafts or the housing after flushing and the amount may be as much as a pound or two, depending on the size of the case. This condition will be evident if the recommended quantity listed in Lubrication Diagrams or Wall Charts more than fills the case.

After flushing the cases, the correct grade of lubricant for expected temperatures to be encountered during the next 5000 miles of driving should be added. The grade of lubricant added should be checked carefully. Some drivers will not put 5000 miles, or any appreciable fraction thereof, on the speedometers this summer, yet some customers may be using vehicles for business and require an additional drain before next autumn. Another point to be checked is the lubricants available. The materials situation may alter the composition of some lubricants. It would be good policy this spring for every serviceman to double check with lubrication diagrams and wall charts, and then go over supplies' service bulletins to make sure that gears are serviced with the correct grade of lubricant.

Gear cases should be filled only to plug level, and if extreme heat conditions are to be a factor it is better to have the level ¼ or ½ in. below plug level. Customers can be told of the care taken in filling the housings. A good merchandising point is the reminder that if too much lubricant is added it may leak out and cause damage, such as getting on the brakes.

Each car model has from 25 to 40 important lubricant points, in addition to the crankcase and gear boxes. Lubricant fittings, in general, require chassis lubricant, although there are points that take water pump grease or wheel bearing grease. The location of the points, and the type of lubricant to be applied, can be determined easily by using Lubrication Diagrams.

Most universal joints are of the needle bearing type. These require disassembly, cleaning, and relubrication. A few models have joints lubricated through a fitting.

An important part of the car is the steering gear. The lubricant level should be kept high, but a pressure gun should not be used.

Electrical units should be adequately lubricated, but over-lubrication may cause failures. Lubricant should be used sparingly on the generator and starter. If possible the commutator cover should be removed to make sure the commutator and bushings are not saturated with grease. Intervals for generator and starter lubrication extend up to 6000 miles on some models. The distributor shaft usually requires a lubricant, which may be motor oil, cup grease, or chassis lubricant. Excess lubricant may work up to the distributor head and cause damage by arcing the breaker points.

Examination of the under-parts of the car during chassis lubrication is a vital merchandising point for this part of the Spring Change-Over Season servicing. Drag link, tie rod, springs, tail pipe, muffler, and other parts can be checked and the condition reported to the owner. An accurate report may save the owner some costly repairs, and possibly a damaged car in case of breakage during operation.

CRANKCASE SERVICE

The stand-by of the spring lubrication service is the seasonal drain, flush and refill of summer grade of oil. The grade of oil for the refill needs to be checked, and servicemen kept informed, since some car manufacturers are recommending lighter grades for summer. Two manufacturers, Studebaker and Cadillac, already have changed recommendations to SAE 10W, where car speeds do not exceed the wartime restriction of 35 m.p.h. This grade is to provide better lubrication at low speeds, Cadillac points out there may be a slight increase in oil consumption, but a probable increase in mileage from precious gasoline.

In performing crankcase service, it is better to drain while the engine is hot and to leave the drain plug out as long as possible. The Ford 6 and some other models have an oil strainer that comes out with the plug and this should be cleaned.

A flushing job is in order to clean out the crankcase and the inside of the engine. This service can be performed with a flushing unit, or a good quality flushing oil circulated by the engine. SAE 10 or 10W can be used if flushing oil is not available. The crankcase should be filled to half of normal capacity and the engine operated at slightly above idling speed for about 10 minutes. The drain plug should be removed quickly, to get out the suspended matter before it can settle out of the oil. It is advisable to add a quart or two of oil of the next heavier grade than the recommended grade after a flushing job in models having an oil sump that retains a large percent of the flushing oil. The extra, heavier oil, will compensate for the

The INSTITUTE SPOKESMAN

Published monthly by

THE NATIONAL LUBRICATING GREASE INSTITUTE

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flushing oil that remains in the crankcase tending to thin out the new oil.

Capacities of the various crankcases, and the grade of oil to be used in spring and summer driving can be determined from Lubrication Diagrams and Wall Charts.

How long has it been since your serviceman made a motor oil presentation to customers?

Customers may be thinking of oil only in terms of lubrication, overlooking or forgetting the other functions of cleaning, cooling, and sealing the engine. A customer is not going to stand hitched to listen to such a presentation every time he comes into the station, but customers spend a little time at least in giving the Spring Change-Over order and a seasonal reminder of the functions of oil makes it easier to sell subsequent drains.

SERVICE MAN'S GUIDE To Automotive Lubrication contains the whole basic story. This information along with the presentation of the superiority of each brand of oil enables the serviceman to dramatize oil.

A related feature of the crankcase service is to check all engine openings and make sure these are operating. The air cleaners on the carburetor and on the oil fill line should be serviced in accordance with recommendations shown on the Lubrication Diagrams.

VENTILATING SYSTEM

The crankcase ventilating system should be checked thoroughly to make sure it is functioning. A system not working right may result in the building up of pressure on account of blow-by forcing oil out the rear main bearing, and thus increasing oil consumption.

If a serviceman checks the ventilating system it is good merchandising policy to report this to the car owner, and explain why the service was performed.

Oil filter elements need to be replaced about every 8000 miles. Installation mileage usually is scratched on the filter, and the serviceman can compare the notation with the speedometer reading to see if a replacement should be suggested. Information on replacements can be obtained from Accessory Manual.

Rubber Lubricants Preserve Rubber Parts

By HAROLD ROSEN

President, American Grease Stick Co.

Within the past few years the use of rubber in automobiles and trucks has increased enormously and the modern passenger car has anywhere from 150 to 300 rubber parts.

Many of these parts are subject to movement or oscillation but the large majority of the rubber parts are in the nature of mountings on which there is practically no motion.

It is now, and has been for some time, considered good service practice to apply a special rubber lubricant to those parts that do have motion where squeaks or noises are likely to occur.

It is pretty generally understood, of course, that any type of mineral oil such as motor oil, gear lubricant, chassis lubricant, etc., is highly destructive to natural rubber and will cause it to swell, rot and lose its elasticity. Under no circumstances should mineral oil ever be used on natural rubber. Some types of synthetic rubber are not adversely affected by mineral oils, but it is extremely difficult to tell from inspection whether the part is natural rubber or synthetic rubber, therefore, the best practice is to use nothing but rubber lubricant on a rubber or synthetic rubber part.

With the present rubber situation, of course, it is practically impossible to get any new rubber parts and the question has been brought up as to whether all rubber parts should be covered with rubber lubricant for the purpose of preservation and prolonged life.

We are reliably informed that the only thing that would be accomplished by such application would be to make the rubber surfaces resistant to mineral oils and greases and would, therefore, serve to prevent the mineral oils from attacking the rubber. As to the actual preservation, this is highly problematical because the natural deterioration of rubber comes largely from the action of heat, sunlight, oxidation from the air, and oil. The more the rubber can be protected from these elements, the longer will be its life. There are, at the present time, some products that have recently been placed on the market and advertised as preservatives of tires and other parts by protecting them from these elements. There is not sufficient experience available to indicate to what extent these materials may be effective.

With the already large number of things that the lubrication man has to do and come within the ceiling price of a lubrication job, it can hardly be expected, therefore, that he could economically handle the entire rubber situation from the standpoint of a preservative.

It would seem at the present time that much can be accomplished by keeping mineral oil, penetrating oil and other materials of this type away from rubber parts, either by shielding them or removing the surplus oil which might come in contact with the rubber.

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Spring Cooling System Service—

What To Do With Permanent Type Anti-Freeze Solutions

By D. H. GREEN

Service Manager Cooling System Products Division

National Carbon Co., Inc.

When saving used anti-freeze solution for re-use next winter, the effect of further use of the solution on the cooling system should receive special consideration this year. Because of war emergency conditions — discontinuance of car production for civilian use, shortage of replacement parts and labor, and the increasing demand on existing vehicles for essential services,—it is more important than ever now to take the best possible care of the cooling system as well as other parts of the automobile, so as to prolong its life.

Standard anti-freeze products contain special ingredients called "inhibitors" which are added by the manufacturer to protect cooling system metals against corrosion and to prevent the formation of rust which would clog the radiator. Some anti-freezes contain other inhibitors that prevent solution loss from creepage and foaming. All inhibitors are weakened and finally exhausted in service, but it is impossible to tell how long they will last in any particular car. It depends on how well the car is taken care of, and how far and fast driven.

In normal times the ideal procedure is to install a fresh filling of your favorite anti-freeze every fall, but for the duration of the war, this may not always be possible. If the car owner finds it necessary or desires to re-use anti-freeze solution on his own responsibility, the following procedure is suggested, to reduce the hazards of corrosion, rust clogging, overheating and freeze-up to a minimum, in the absence of any special instructions from the anti-freeze or vehicle manufacturer.

Nine Point Program

1. Do not leave the solution in the cooling system during the summer months, since inhibitor ingredients are weakened or used up by driving, and the anti-freeze protection is often lost by leakage and overfilling with water during warm weather.

2. Before draining the solution from the car when freezing weather is past, have it tested for anti-freeze strength. Very weak solutions may not be worth saving.

3. If the solution drains rusty or the radiator looks rusty or greasy inside, clean the cooling system with a cleaner that will remove rust and grease by dissolving action. If the use of a radiator cleaner is found unnecessary, the system should at least be thoroughly flushed with water.

4. To prevent rust formation and possible damage from water corrosion during warm weather driving, install a standard summer rust inhibitor with a fresh filling of water. To obtain the longest trouble-free service from the cooling system, keep it clean, rust-proofed, leak-tight and in proper working order, summer and winter.

5. Do not plan to re-use solution that drains out brown or rusty, and upon standing does not clear up practically water-white or the original color of the fresh anti-freeze, since this condition is an indication that the inhibitors are used up. A badly contaminated anti-freeze solution with exhausted inhibitors may cause more rust and corrosion than fresh water.

6. Store saved solutions in sealed and labeled glass containers. Thin steel cans often rust through from the outside.

7. Before a used solution is returned to the cooling system in the fall, it should again be tested for anti-freeze strength. If necessary to increase the freezing protection of the solution, add fresh anti-freeze of the same brand if available, otherwise use a complete fresh filling of some other well known brand which you are sure will protect the cooling system against corrosion as well as freezing.

8. Because of unpredictable complications that might result from the chemical action of various types of inhibitors on one another, we would caution against mixing different brands of inhibited anti-freeze in the cooling system. A mixture of alcohol and permanent anti-freeze cannot be correctly tested with a standard commercial anti-freeze tester.

9. When anti-freeze solution is used for more than one winter, it should be frequently tested and inspected. When the solution becomes brown or rusty in the radiator, it should be discarded immediately, even though a satisfactory test can be obtained on freezing protection.

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The Railroad Aspect of Lubricating Greases

(Continued from page 1)

trolled by inserting a perforated metal plate between the grease cake and the journal, the size and spacing of the perforations preventing the grease from being used too rapidly. The driving journals of locomotives are relatively large, running from 10 to 12″ in diameter and about that length, and the static loads are moderate, averaging 200 or 300 pounds per square inch. Speeds are slow, being of the order of 300 or 400 R.P.M. at the maximum. Temperatures are fairly high, averaging around 300° F., and, in some cases, where abnormal conditions exist, perhaps as high as 400° F. The journals are generally ordinary carbon steel, heat treated, and the bearings are almost invariably a copper-tin-lead bronze, averaging 15 to 20% lead. These conditions of use sound extremely moderate, but, because of irregularities in track imposing undue loads on certain bearings, distortions in alignment of the locomotive itself, conditions of impact in starting, there may be brief periods of extreme overload which the grease must stand in order to prevent damage to the bearings or journals. A locomotive journal bearing has to carry its full load from a cold start, which in the northern part of the United States may be 30 or 40° below zero, and the grease must lubricate at that temperature, as well as at the maximum temperature attained during a long hard run. It is remarkable that such a small quantity of grease will successfully lubricate over a long mileage and consumption figures will average from 40 to as high as 70 locomotive miles per pound of grease consumed. This is not per bearing but for the entire locomotive, which may include ten or more journals.

The grease must obviously be capable of feeding over an extremely wide range of temperature. It must have a high melting point to avoid excessive consumption at running temperatures. It must have good stability in storage where it is usually kept in the form of pre-molded cakes wrapped in paper to exclude dirt. It must not bleed or lose oil at working temperatures, as this would tend to cause the formation of a crust or cake which would impair or stop the feeding through the perforated metal plate. It must be of such consistency and adhesiveness that it can be molded into sticks which are used through suitable pressure gun equipment in the lubrication of pins. Some railroads use special classes of grease for pin lubrication. It is our practice to use the same driving journal compound on pins as we use on journals, and generally the grease cakes which have worn too thin to make another trip on the journal are reclaimed by molding them by pressure into stick form for use as pin grease.

The rail curve grease is an extremely interesting material and works under very adverse conditions of service. It can be described generally as an ordinary cup grease of a No. 2 or No. 3 consistency, in which has been incorporated approximately 10% of graphite. It is used to lubricate the sides of rails on curves so as to prevent the excessive abrasion between flanges of wheels and sides of rails that would otherwise occur. You all know that the wheels on a railroad car or locomotive axle are rigidly attached to the axle, there is no differential. Consequently, in going around a curve either the inside or outside wheel has to slip on the rail to some extent. It is not this slipping which the curve grease is intended to facilitate, and it is important that the grease not reach the top or tread contact surface of the rail since this would induce spinning of the locomotive drivers. The curve grease is fed from stationary containers to the side of the rail by means of a metal feed bar three or four feet in length which lies against the inside of the high or outside rail on the curve. The passage of each wheel over this bar depresses it because of the flange of the wheel extending below the top surface of the rail and the movement of the bar by means of ratchet and cam arrangements actuates a pump which causes the grease to flow from the containers through perforations in the feed bar which deposit the grease on the side of the rail, from which point it is picked up by the wheel flanges as they pass that location and carried along for considerable distances. One rail lubricator will take care of an entire curve and traces of the curve grease will be found on the side of the rail as much as a mile from the point of application.

The intensity of pressure between the flanges of the wheels and the top inside corner on the outside rail of a curve is very great. As an illustration of a typical condition, it has been calculated mathematically that a 70-ton fully loaded freight car traveling 40 miles per hour around a 4° curve with 2″ of super-elevation, will result in an intensity of contact pressure between wheel and rail of approximately 600,000 pounds per square inch. This high intensity of pressure is actually the result of poor fit between the contour of the rail and the contour of the wheel flange. Because of an almost infinite variety of shapes of both rail and flange due to differing degrees and types of wear, it is impossible to achieve a good fit between the wheel flange and rail. It has similarly been calculated, however, that if a better mating of wheel flange and rail could be achieved, the calculated stress-

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es might be reduced to about 100,000 pounds per square inch of contact area. Studies are being made at the present time to see whether, by redesigning the shape of wheels or rail heads, or both, it may be possible to reduce these excessive working pressures. Inherently, however, they will always be extremely high. It should be remembered that the action of rail on wheel in turning a car on curved track is necessarily an intense sideways thrust. There is a scraping or wiping action between wheel and rail and to stand up under this punishment a grease of extremely high film strength is necessary. The graphite incorporated in the typical rail curve grease accomplishes that end.

We have many points of interest when we examine samples of rail curve grease in the laboratory. We are interested in its consistency at various temperatures, since the feeding devices are outdoors, and the temperature of the grease will vary on our railroad from perhaps zero to 125 or more degrees. The freezing or solidifying point of the grease must be low enough so that it will never freeze and thus interrupt the feed. It must have good stability in order to prevent separation of oil during storage or in the feeding devices and similarly under high temperature storage conditions the graphite must not settle to the bottom of the containers. It should not change its consistency when stored for long periods at high temperatures and it must be free from tendency to cake or crust on the surface when exposed to the air at high temperatures for considerable periods. It should have good adhesiveness, since, for the reason stated, it is extremely important that the grease film be confined to the side of the rail and the contacting flange and that it not work up on the head of the rail. It must be resistant to washing by water in order that the lubricating film will remain in place in rainy weather. So far, we have not attempted to work up a specification for this type of grease, but, when we test grease to see whether it is suitable for this application, we include examination to determine all of the factors noted above, in addition to the usual chemical analysis and tests of the consistency, viscosity of lubricating oil, etc. I should explain that the reason for using curve grease is primarily to prevent excessive wear of rail and wheel flanges. It probably has some beneficial effect in reducing the tractive effect necessary to carry a train around a curve but its main function is to prolong the life of rail on curves. Experience has shown that where curve cutting is serious, the life of rail may be prolonged many times by proper use of lubricators.

Pressure gun grease for railroads is used similarly to ordinary chassis lubricant on automobiles. The bearings where pressure gun grease is used are generally in the lighter service positions, such as in valve motion. Almost invariably they are simple bearings with steel pins and bronze bushings. The fits may be poor, particularly just before a locomotive goes to the shop for overhaul. The general characteristics of a locomotive pressure gun grease are similar to those of a high grade chassis lubricant. We have prepared such a specification on Southern Railway which has been very satisfactory over several years of use. It calls for a calcium base grease, with penetration at 77° F. from 240 to 280, a minimum of 80% mineral oil having a viscosity at 100° F. not lower than 750 seconds, and a pour point not higher than +15° F.

There is one requirement in our specification, namely, that for adhesiveness, which is quite interesting. In order to reduce consumption and to improve lubricating efficiency, it is extremely desirable that this grease shall be highly adhesive and shall resist being thrown out of bearings by high centrifugal forces or by slapping action caused by worn surfaces and sloppy fits. In preparing our specification I searched unsuccessfully for a standard method of determining adhesiveness, and, not finding one, we were forced to devise tests and apparatus to determine this property. You may be interested in the description of the adhesiveness test which I quote from our specification as follows:

"Adhesiveness shall be measured according to the following procedure: The test instrument shall consist of a flat faced circular drop hammer mounted vertically in guides so that it can fall freely through a distance of 30 centimeters. The diameter of the striking face shall be 30 millimeters and the total weight of the moving parts shall be 1,000 grams. The hammer shall be mounted so that the face will strike a smooth flat metal bottom plate solidly supported exacting parallel with the striking face of the hammer. A sample of the grease to be tested shall be worked in the ASTM grease worker (Method D-217-38-T) and then promptly brought to the testing temperature. Four grams (4 grams, plus or minus 0.1 gram) of the grease shall be placed on the striking face of the hammer in conical or dome shaped mass, avoiding any inclusion of air, and the hammer shall be allowed to drop 30 cm. The grease will be spread over the surface of the metal bottom plate by the force of the blow, and the area over which it is distributed will be a measure of the adhesiveness. The test will be made with the grease at 95 to 105° F. and manipulation shall be rapid to avoid temperature change during the test. In order to be acceptable, grease shall not spread beyond a circle 12 centimeters in diameter and the area within the limits to which it spreads shall be completely covered without spattering or flying. Splash guards are desirable and for convenience a tared spatula may be used to weigh out the sample and to transfer it to the hammer face. It is also convenient to remove the striking head from the guide rod while applying the sample. The weighing out of sample, transfer to striking face, mounting on guide rod and drop should be accomplished within about 20 seconds."

We have found the above test very desirable and convenient in determining the property of adhesiveness. The equipment is not expensive and can be made in almost any shop and the manipulation is simple and quick. It should be noted that this test is significant only in comparing the adhesiveness of greases which have practically the same consistency as measured by penetration.

Brake cylinder lubricant is used to lubricate the pistons in air brake cylinders. These pistons are fitted with a rubber-like flexible packing cup which forms the seal between the piston and the cylinder wall and the brake cylinder grease is used between this packing cup and the cylinder wall. Brake cylinders are on the average perhaps 10" in diameter and have about the same stroke. They operate at slow speed and only intermittently, once for each brake application. They must remain in service without lubrication or other attention, however, for long periods and the Association of American Railroads contemplates establishing a 3-year interval for the inspection and lubrication of air brake cylinders. For such service an extremely stable lubricant is required. The Association of American Railroads has within the past few weeks adopted a specification for brake cylinder lubricant, in which I am sure you will be interested. This specification has been given the designation of M-914-42. The grease consists of a calcium base-mineral oil combination, with 80 to 85% oil having a viscosity of 550 to 700 seconds at 100° F. Requirements are included for not more than 0.25% free fatty acid and not more than 0.15% uncombined lime. The consistency is 250 to 300 penetration at 77° F. and not less than 150 penetration at 0° F. There is also a freezing point requirement, stating that the grease shall not become solid at minus 40° F. Probably the most difficult part of the specification requirements is the oil separation test, in which a 10-gram sample of the grease supported on wire mesh in an oven at a temperature of 175° F. for seven days must not

show any separation whatever of oil. A single drop of oil falling from the supporting metal screen in this test will disqualify the sample. The requirements of this specification are based on research work conducted by the Westinghouse Air Brake Company and at the present time I understand there are only three grease manufacturers in the United States who are prepared to produce grease to these requirements. With the adoption of this specification as a standard of the Association of American Railroads, there will, of course, be considerable purchases and presumably other manufacturers will find means to comply.

The residual greases are the real unknown quantity among railroad lubricants as far as I am concerned. We have not been able to develop any specifications for them or to find out very much about what makes a good grease of this type or a bad one. Considering such greases as blends of an asphalt and of a lubricating oil, it would be extremely valuable to know whether for a given application it would be desirable to have a relatively small amount of a hard asphalt with a given lubricating oil or a relatively larger amount of a softer asphalt. It would also be helpful if we could learn whether the oil phase of such a mixture should be heavy oil or light oil. There must be some relationship between constituents and quality of the grease produced. Under the present conditions with our lack of information, it is extremely difficult to compart one grease of this type with another or to determine whether a given type of grease is suitable for a particular application. We use these greases on the hub surfaces of locomotives, that is, the surfaces which control the lateral movement. The application is usually by crude means, a bucket and wooden paddle often being employed. The greases are also extensively used on traction motor gears on Diesel-electric equipment.

One of the worst headaches in connection with greases is that existing in the case of the great variety of small power hand tools which we use in the shops and in maintenance of way work. Such tools are bolt tighteners, drills, power saws, ballast tamping tools, spike pullers and drivers, adzing devices, etc. Almost invariably the manufacturer of such tools, practically all of which employ anti-friction bearings, will recommend one particular type of grease for the lubrication of his tool. Different manufacturers do not make the same recommendations and the result of this is an extremely varied assortment of greases which we must purchase and stock at many points in lots of only a few pounds each. I feel certain without having data to justify myself that a great deal of this complication in storekeeping is really not necessary but we have not had the courage to ignore tool manufacturers' recommendations and, therefore, continue this annoying and somewhat expensive practice. It seems certain that all of the lubricating needs of small tools of this sort could be served by a very few types of grease, perhaps three or four at the most. If the tool manufacturers could only get together and agree on those types, it would certainly be extremely helpful to the railroad user of such equipment. As it is, because of the relatively small volume involved, there is not a great deal of incentive for grease manufacturers to engage in the necessary research required to develop this information.

As a specification writer, I would like to leave one thought with your group. It is a fact that a great many of our specifications which are used as a basis of purchase are not truly specifications at all but merely descriptions of some product or products which prior experience has already shown to do that particular piece of work successfully. Our specifications should include all of the satisfactory materials and exclude all of the unsatisfactory ones. They fail to do this, however, in many cases, usually in the direction of excluding products which fail to meet the specification but which may be just as effective as those products which do meet the specification. This situation is probably more prevalent in connection with specifications for lubricants than it is for other items. I know of no grease specifications, for instance, that actually say anything about the lubricating ability of the product, although that is the function for which it is intended. Our specifications for paint are built around descriptions of certain ingredients rather than around the performance of the paint itself. Even in steel products, where specification development is well standardized, our requirements fail to describe or control the actual function accurately and are only a description of certain properties of some previous item which worked successfully. If through the work of this Institute you gentlemen could offer to your consumers some rational means of describing and testing the properties of lubricating greases that are truly responsible for the performance characteristics, you would be rendering an invaluable service which would be greatly appreciated by everyone concerned with specification preparation, testing or purchasing.

In the foregoing remarks I have covered some of the items which the railroad user of grease thinks about. If through hearing these you will be enabled to produce products that would better fill our requirements, I shall be very gratified.

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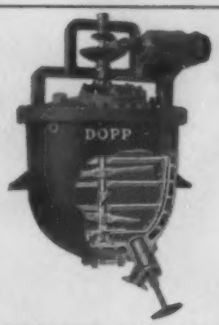
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